

Electro-Voice®
a MARK IV company

PRO-8A PRO-8AT5 PRO-8AT30 Wide-Range Two-Way Speaker

SPECIFICATIONS

Frequency Response:
80-16,000 Hz ± 3 dB
(See Figure 1)

Power Handling:
30 watts (EIA RS-426A)

Impedance (minimum at 230 Hz):
8 ohms

**Sound Pressure Level at 1 Meter,
1 Watt Input,**
200-4,000-Hz Average:
96 dB

Voice Coil Diameter:
3.81 cm (1.5 in.)

Magnet Weight:
0.32 kg (0.72 lb)

Magnet Material:
Barium ferrite

Tweeter
3.31 cm (1.5 in.) piezoelectric transducer

Color, Frame:
Black

Dimensions:
See AES Specifications section

Net Weight:
1.2 kg (2.7 lb)

Shipping Weight:
1.5 kg (3.3 lb)

Transformer,
PRO-8AT5:
TM5 with 25-, 70.7- or 100-volt line inputs
PRO-8AT30:
TM30 with 25-, 70.7- or 100-volt line inputs
(see Table 1 for power taps)

DESCRIPTION

The PRO-8A full-range reproducer is an 8-inch, 8-ohm, 2-way coaxial loudspeaker designed for professional high-quality distributed sound systems. A developmental program combining state-of-the-art engineering techniques with extensive listening evaluations resulted in the PRO-8A being an accurate, highly intelligible and musical sounding loudspeaker that is well suited for the reproduction of both voice and music.

The PRO-8A¹ represents a new concept in 8-inch ceiling speaker design. The woofer section employs a 1½-inch voice coil. Large by ceiling-speaker standards, the oversized voice coil provides increased apex-driving-point cone area and greater thermal capabilities, enabling unusually high acoustic power output for this class of loudspeaker. At lower levels this translates to unmatched durability and reliability. The high frequencies are reproduced by a 1½-inch piezoelectric tweeter that is mounted directly to the pole piece of the woofer. The small size of the tweeter (smaller than is typically used in ceiling speakers) eliminates the usual high-frequency beaming, while being mounted to a stationary surface minimizes intermodulation distortion. The tweeter being located at the apex of the woofer allows for improved time alignment over other coaxial ceiling speaker designs. An acoustically transparent dust dome mounted on the woofer cone encapsulates the tweeter offering excellent dust protection for both the woofer voice coil and the tweeter.

¹ Patent Pending.

The PRO-8AT5 and the PRO-8AT30 are low- and high-power transformer versions of the PRO-8A. The PRO-8AT5 allows for connection to 25-, 70.7-, or 100-volt systems of 0.62 to 5 watts, while the PRO-8AT30 allows for connection to 25-, 70.7- or 100-volt systems of 3.75 to 30 watts.

DIRECTIONAL PERFORMANCE

The directional characteristics of the PRO-8A in a 0.25-cubic-foot vented enclosure were measured by running a set of polar responses in EV's large anechoic chamber. The test signal was ⅓-octave-band-limited pseudo-random pink noise centered at the ISO standard frequencies indicated in Figure 3.

Additional typical data is provided in Figures 4 and 5 which indicate 6-dB-down beamwidth versus frequency and directivity factor, respectively, for a PRO-8A in the test enclosure.

POWER HANDLING TEST

To our knowledge, Electro-Voice was the first U.S. manufacturer to develop and publish a power test closely related to real life conditions. First, we use a random noise input signal because it contains many frequencies simultaneously, just like real voice or instrument program. Second, our signal contains more energy at extremely high and low frequencies than typical actual program, adding an extra measure of reliability. Third, the test signal includes not only the overall "long-term average" or "continuous" level — which our ears interpret as loudness —

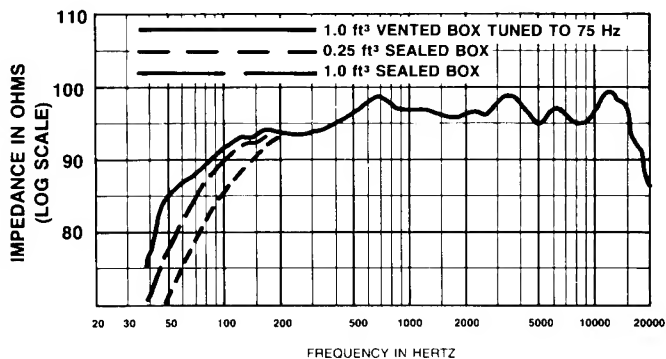


FIGURE 1 — Axial Frequency Response 1 Watt/1 Meter

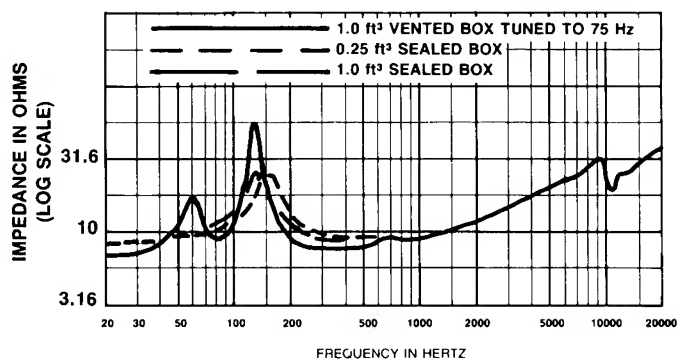


FIGURE 2 — Input Impedance vs. Frequency

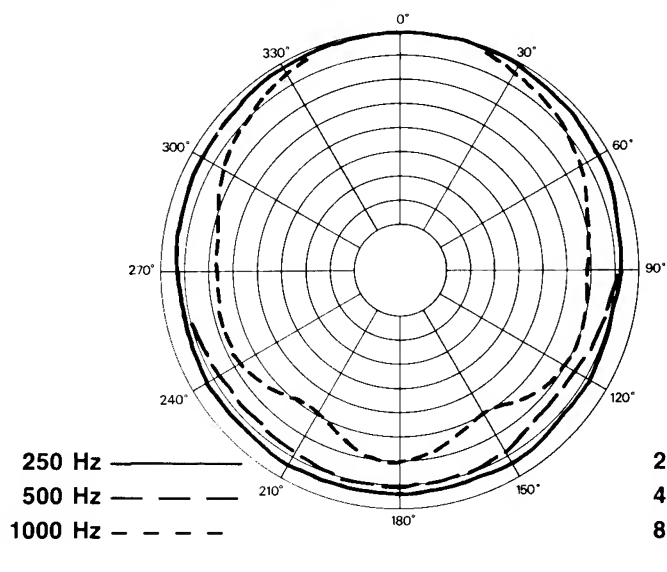


FIGURE 3A — PRO-8A Polar Response in 0.25 ft³ Sealed Box 4V RMS of 1/3-Octave-Band-Limited Noise in Anechoic Environment, 10 Feet on Axis (5 dB per division)

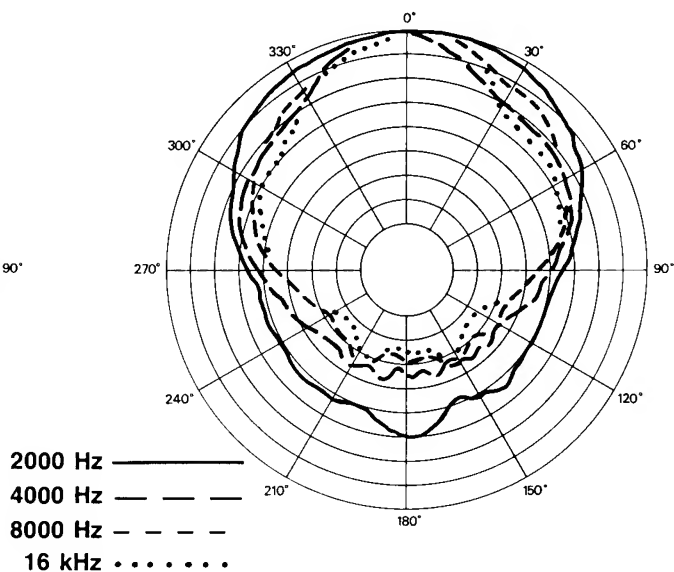


FIGURE 3B — PRO-8A Polar Response in 0.25 ft³ Sealed Box 4V RMS of 1/3-Octave-Band-Limited Noise in Anechoic Environment, 10 Feet on Axis (5 dB per division)

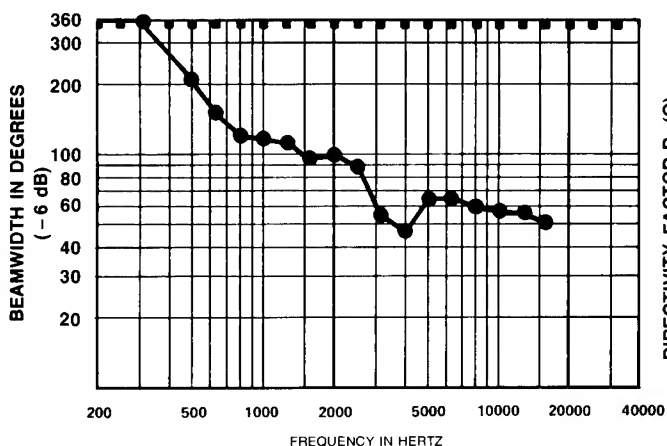


FIGURE 4 — PRO-8A Beamwidth vs. Frequency in 0.25 ft³ Sealed Box

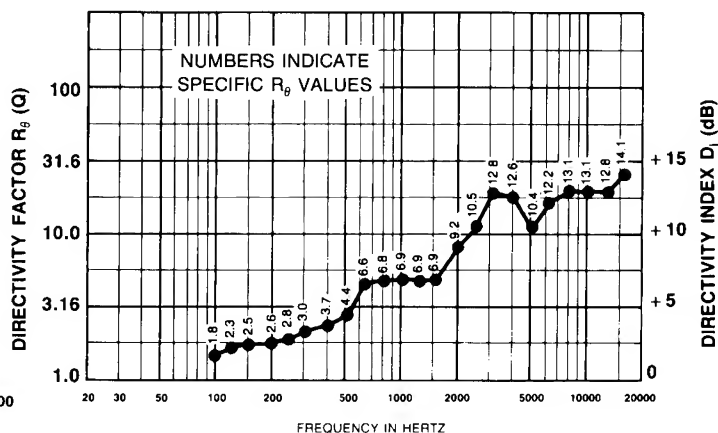


FIGURE 5 — PRO-8A Directivity Factor and Directivity Index vs. Frequency in a 0.25 ft³ Sealed Box

LINE VOLTAGE	25V	70.7V	100V
PRO-8AT5	0.62 W	0.62 W	—
	1.25 W	1.25 W	1.25 W
	2.5 W	2.5 W	2.5 W
	5 W	5 W	5 W
PRO-8AT30	3.75 W	3.75 W	7.5 W
	7.5 W	7.5 W	15 W
	15 W	15 W	30 W
	30 W	30 W	—

TABLE 1 — Rating of Primary Taps

but also short-duration peaks which are many times higher than the average, just like actual program. The long-term average level stresses the speaker thermally (heat). The instantaneous peaks test mechanical reliability (cone and diaphragm excursion). Note that the sine-wave test signals sometimes used have a much less demanding peak value relative to their average level. In actual use, long-term average levels exist from several seconds on up, but we apply the long-term average for eight hours, adding another extra measure of reliability.

Specifically, the PRO-8A is designed to withstand the power test described in EIA Standard RS-426A. The EIA test spectrum is applied for eight hours. To obtain the spectrum, the output of a white noise generator (white noise is a particular type of random noise with equal energy per bandwidth in Hz) is fed to a shaping filter with 6-dB-per-octave slopes below 40 Hz and above 318 Hz. When measured with the usual constant-percentage-bandwidth analyzer (one-third-octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1200 Hz with a 3-dB-per-octave slope above 1200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 30 watts

into the EIA equivalent impedance (14.1 volts true RMS). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 120 watts peak (28.2 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

RECOMMENDED CONNECTIONS

The PRO-8A is a nominal 8-ohm impedance loudspeaker with a 30-watt input capability. However, it is also available with transformer inputs for both low- and high-power applications. The PRO-8AT5 utilizes the TM5 5-watt, 25/70.7/100-volt universal line matching transformer with power taps ranging from 0.62 to 5 watts, while the PRO-8AT30 utilizes the TM30 30-watt, 25/70.7/100-volt transformer with power taps ranging from 3.75 to 30 watts. On both of the transformer versions, the transformer is attached and the secondary is hard wired to the input terminals of the loudspeaker leaving the primary accessible for the user to select any of the power taps indicated in Table 1.

RECOMMENDED ENCLOSURES AND Baffles

The PRO-8A, PRO-8AT5 and PRO-8AT30 are designed to fit on standard 8-inch ceiling speaker baffles. Additionally, these loudspeakers will accommodate the use of any standard back enclosure with a diameter of 9.8 inches or greater and a depth of at least 4.0 inches. Larger back volumes will increase the lower frequency output. The frequency responses of a PRO-8A in typical 0.25-cubic-foot and 1.0-cubic-foot back enclosures are shown in Figure 1.

The PRO-8A may be used in ported enclosures where improved low-frequency response is desired. Placing the loudspeaker in an enclosure of 1.0 cubic foot with a box-tuning frequency of 75 Hz will yield a -3 dB

point of 80 Hz as shown in Figure 1. An 80-Hz tuning may be obtained with a port having an area of 7.0 square inches and a length of 0.75 inches.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker shall be a coaxial type loudspeaker with a nominal diameter of 200 mm (8 in.), an overall depth of 80 mm (3.15 in.) and shall weigh no more than 1.2 kg (2.7 lb). The voice coil shall have a nominal diameter of 38 mm (1.5 in.) and depth of 7.6 mm (0.3 in.) and shall operate in a gap of not less than 0.92 T (9200 Gauss). High frequencies shall be reproduced by a 38-mm (1½-in.) piezoelectric transducer attached to the pole piece of the low-frequency device and protected from dust by a dust dome fastened to the low-frequency cone.

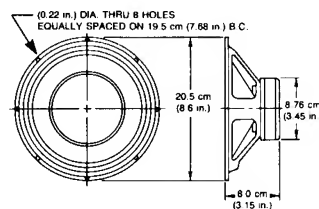
The loudspeaker shall exhibit a sensitivity (SPL, 1 W at 1 m [3.28 ft.] swept 500-5,000 Hz) of no less than 96 dB on axis maintaining an essentially flat frequency response with -3 dB points at 115 Hz and 14,000 Hz in a 12-cubic-foot sealed box in a free field. The half-space reference efficiency shall be 2.0%. The nominal impedance shall be 8 ohms and the dc resistance shall be 5.7 ohms. The loudspeaker shall be capable of handling a continuous 30-watt (14.1 volts true RMS) shaped white-noise signal (as per EIA Standard RS-426A) with a 6-dB crest factor for eight hours.

The loudspeaker shall be the Electro-Voice model PRO-8A.

AES SPECIFICATIONS

The following specifications are in accordance with the "AES Recommended Practice for Specification of Loudspeaker Components used in Professional Sound Reinforcement Systems — 1983."

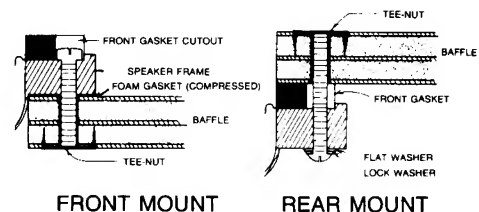
Dimension and Weight,



Net Weight: 1.2 kg (2.7 lb)
Shipping Weight: 1.5 kg (3.3 lb)

Mounting:

The PRO-8A may be front- or rear-mounted against either surface of its mounting flange and requires a 184 mm (7.25 in.) diameter cutout and a 195-mm (7.68-in.) bolt circle. Normal fasteners up to 5 mm (0.20 in.) will fit through the eight holes in the frame. The PRO-8A is designed for mounting on standard ceiling speaker baffles.



Electrical Connectors:

The PRO-8A is fitted with a pair of color-coded solder terminals. One conductor of #16 AWG stranded, #15 AWG solid, a pair of twisted #22 AWG stranded or a pair of #21 AWG solid conductors will fit. A positive electrical signal applied to the red (+) terminal will displace the cone away from the magnet, thus producing a positive acoustic pressure.

Additional Descriptive Information,

Voice-Coil Material:

Copper

Voice-Coil Insulation:

Polyimide, 220 degree C rating

Coil Form:

Polyimide

Magnet Frame:

22 ga. stamped steel

Paint:

Black zinc

Magnet Plating:

Bright cadmium

Physical Constants,

Effective Piston Diameter:

17.0 cm (6.7 in.)

Total Moving Mass:

0.0072 kg (0.25 oz)

Voice-Coil-Winding Depth:

7.62 mm (0.3 in.)

Voice-Coil-Winding Length:

9.08 m (29.8 ft)

Top Plate Thickness at Voice Coil:

6 mm (0.236 in.)

Z_{min} :

7.5 ohms

BI Factor:

6.5 testa meter

Thiele-Small Parameters,

f_s : 110 Hz

Q_{ts} : 0.80

η_o : 2.0%

V_{as} : 0.0146 m³ (0.52 ft³)

R_e : 5.7 ohms

S_d : 0.023 m³ (35 in.²)

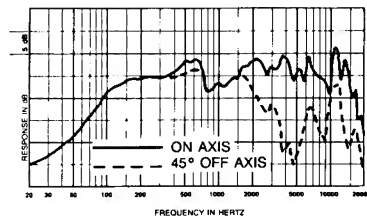
Large-Signal Parameters,

$P_{e(max)}$: 30 watts

X_{max} : 1.40 mm (0.055 in.)

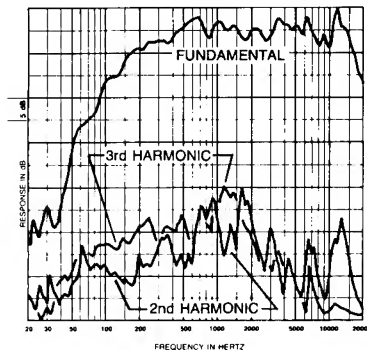
Note: X_{max} is the one-way peak excursion which produces 10% THD of the current waveform when driven at f_s .

Response in Standard Baffle

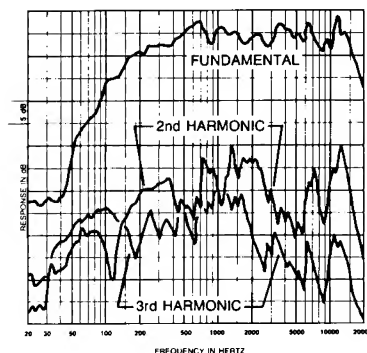


NOTE: AES requires a large, planar baffle for this test, WHICH IS INTENDED TO SHOW SMOOTHNESS AND OFF-AXIS RESPONSE, NOT BASS RESPONSE. This has proven to be inconvenient and prohibitive, due to its size. Here, we have chosen our lab standard low-diffraction 12-cubic-foot test enclosure, which will demonstrate the same characteristics as the "AES standard baffle."

Distortion Response



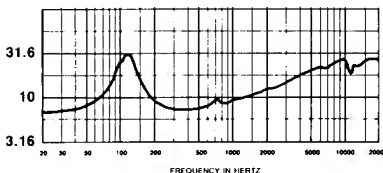
0.3 WATTS



3 WATTS

Impedance Response:

(See Figures 3A, B for box Z curves)



FREE AIR

Power Handling (two hours):

30 watts, 50-500 Hz, pink noise,

12-dB/octave filters

40 watts, 100-1000 Hz, pink noise,

12-dB/octave filters

NOTES ON POWER TESTS:

The AES recommended two-hour free-air test is a good one and we have assured the user that the PRO-8A will pass this test under the same conditions. For our own use, however, we subject our sample units to a more demanding test; the eight-hour EIA Standard RS-426A. This test brings out deficiencies which may present themselves after a long term of field use.

Displacement Limit:

7.62 mm (0.3 in.)

NOTE: Displacement limit is the one-way peak excursion which, when exceeded, will cause physical damage to the drive mechanism.

Thermal Rise After Power Test:

82 degrees C (147 degrees F)

Recommended Enclosures:

See text.

WARRANTY (Limited)

Electro-Voice Speakers and Speaker Systems (excluding active electronics) are guaranteed for five years from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not extend to finish, appearance items, burned coils, or malfunction due to abuse or operation under other than specified conditions, including cone and/or coil damage resulting from improperly designed enclosures, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee. A list of authorized warranty service agencies is available from Electro-Voice, Inc., 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831); or Electro-Voice West, 8234 Doe Avenue, Visalia, CA 93291 (AC/209-651-7777). This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Service and repair address for this product:

Electro-Voice, Inc., 600 Cecil Street,
Buchanan, Michigan 49107.

Specifications subject to change
without notice.



ELECTRO-VOICE, INC., 600 Cecil Street, Buchanan, Michigan 49107

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